MARIE SKŁODOWSKA-CURIE POSTDOCTORAL FELLOWSHIPS 2023

EXPRESSION OF INTEREST FOR HOSTING MARIE CURIE FELLOWS

HOST INSTITUTION

NOVA School of Science and Technology (FCT NOVA)

RESEARCH GROUP AND URL

IT-Nova, Wireless Technologies
https://www.it.pt/ThematicLines/Index/1

SUPERVISOR (NAME AND E-MAIL)

Prof. Rui Dinis
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SHORT CV OF THE SUPERVISOR

Rui Dinis is a full professor at FCT-UNL and a researcher IT (Instituto de Telecomunicações). Being in charge of IT-Nova lab. He is an IEEE Senior Member and an IEEE VTS Distinguished Speaker and an IEEE ComSoc Distinguished Lecturer. He is or was editor at several major IEEE journals (IEEE Transactions on Wireless Communications, IEEE Transactions on Communications, IEEE Transactions on Vehicular Technology, IEEE Open Access Journal on Communications) and at Elsevier Physical Communication and Hindawi ISRN Communications and Networking). He was part of the Organizing Committee of IEEE ICT'2014, multiple IEEE VTC (2017-Fall, 2018-Spring, 2019-Spring, 2020-Spring, 2021-Spring, 2021-Fall, 2022-Spring, 2023-Spring), IEEE ISWCS'2018, IEEE GLOBECOM (2021 and 2022), IEEE CSNDSP (2020 and 2022). From 2016 until 2022 he was president of VTS Portugal Chapter.

Rui Dinis has been actively involved in several international research projects in the broadband wireless communications area and many national projects, most of them as nuclear researcher and/or in charge of his research center in multi-institutional projects. He has over 20 PhD students (current and past), published 6 books, over 180 journal papers, 15 book chapters and 400 conference papers (of which 5 received best papers' awards), and over 20 patents (attributed or pending).

He was involved in pioneer projects on the use of mm-waves for broadband wireless communications (international projects MBS and SAMBA) and his main research activities are on modulation and transmitter design, nonlinear effects on digital communications and receiver design (detection, equalization, channel estimation and carrier synchronization), with emphasis on frequency-domain implementations, namely for MIMO systems and/or OFDM and SC-FDE modulations. He is also working on cross-layer design and optimization involving PHY, MAC and LLC issues, as well as indoor positioning techniques.

5 SELECTED PUBLICATIONS

1- Oussama Ben Haj Belkacem, Rui Dinis, Mohamed Lassaad Ammari: Nonlinear Effects in NOMA-OFDM Systems: Analytical Signal Characterization and Receiver Design. IEEE Trans. Veh. Technol. 72(3): 3739-3750 (2023)

2- Brena Kelly Sousa Lima, Rui Dinis, Daniel Benevides da Costa, Rodolfo Oliveira, Marko Beko: User Pairing and Power Allocation for UAV-NOMA Systems Based on Multi-Armed Bandit Framework. IEEE Trans. Veh. Technol. 71(12): 13017-13029 (2022)

3- Oussama Ben Haj Belkacem, Mohamed Lassaad Ammari, Rui Dinis: Performance Analysis of NOMA in 5G Systems With HPA Nonlinearities. IEEE Access, 8: 158327-158334 (2020)

4- Zahra Mokhtari, Rui Dinis: Sum-Rate of Cell Free Massive MIMO Systems With Power Amplifier Non-Linearity. IEEE Access 9: 141927-141937 (2021)

5-Oussama Ben Haj Belkacem, Mohamed Lassaad Ammari: Adaptative Modulation Analysis for Energy Harvesting MIMO Systems with TASIMRC. PIMRC 2018: 1-6

PROJECT TITLE AND SHORT DESCRIPTION

Title: dYnAmic resource scHeduling in Massive MIMO based NOMA with RF imperfections and EnergY hArvesting for 6G networks.

Description:

YAHYA-6G aims to propose new signal processing solutions doped with machine-learning. We will focus on the detection and compensation of RF imperfections in mMIMO (massive Multiple input Multiple output) based NOMA (Non-orthogonal multiple access) pair . In other hand, YAHYA-6G target is to minimize the long-term power consumption based on the stochastic optimization theory for mMIMO-NOMA IoT networks with EH (Energy Harvesting) in presence of RF imperfections. The objectives of the YAHYA-6G project are:

1- Identify major RF imperfections that may occur in a multi-access / multi-antenna broadband system.

2- Propose new solutions to optimize the energy efficiency at the RF transmitters. This solution will focus on the power amplifier that represents 60 at 70% of the energy consumed in an RF transmitter.

3- Analyze the impact of these RF imperfections on mobile radio systems exploiting NOMA technologies.

4- Propose a Deep Learning online learning process to detect the NOMA channel characteristics and compensate the effect of HPA nonlinearity. A joint
detection of the NOMA interference and HPA (High Power Amplifier) nonlinearity will be studied in mMIMO-NOMA system.

5- Resolve a non convex based problem coping with the expected 6G requirements, with a particular focus on optimal resource scheduling and computation capacity allocation and reducing energy consumption of wireless devices, through a set of new algorithms .

6- Realize a demonstrator based on the SDR (Software Defined Radio) USRP cards on which some algorithms developed in the project will be implemented.

SCIENTIFIC AREA WHERE THE PROJECT FITS BEST*

Information Science and Engineering (ENG)

***Scientific Area where the project fits best** – Please select/indicate the scientific area according to the panel evaluation areas: Chemistry (CHE) • Social Sciences and Humanities (SOC) • Economic Sciences (ECO) • Information Science and Engineering (ENG) • Environment and Geosciences (ENV) • Life Sciences (LIF) • Mathematics (MAT) • Physics (PHY)